

IN THE CLAIMS:

The text of all pending claims, (including withdrawn claims) is set forth below. Cancelled and not entered claims are indicated with claim number and status only. The claims as listed below show added text with underlining and deleted text with strikethrough. The status of each claim is indicated with one of (original), (currently amended), (cancelled), (withdrawn), (new), (previously presented), or (not entered).

Please CANCEL claims, AMEND claims, and ADD new claims, in accordance with the following:

1. (CURRENTLY AMENDED) A speaker verification apparatus, comprising:
 - an identity claim input part to which an identity claim is input;
 - a speaker selecting part for selecting voice information of a registered speaker corresponding to the identity claim input to the identity claim input part;
 - a speaker storing part for storing voice information of speakers;
 - a voice input part to which a voice is input;
 - a voice analyzing part for analyzing the voice input to the voice input part;
 - a speaker distance calculating part for calculating a verification distance between a feature parameter of the input voice and that of the voice of the registered speaker and the speaker distances between a feature parameter of the input voice and those of the voices of speakers other than the registered speaker that are stored in the speaker sorting part, based on the analysis results of the voice analyzing part and the voice information stored in the speaker storing part; and
 - a speaker judging part for determining whether or not the input voice matches the registered speaker corresponding to the input identity claim;

~~the speaker verification apparatus further comprising:~~

 - a false acceptance error rate input part to which a false acceptance error rate is input as a threshold, the false acceptance error rate being predetermined by a system manager or a user or being adjustable depending on performance; and
 - a distribution estimating part for obtaining a probability distribution of interspeaker distances based on the speaker distances calculated in the speaker distance calculating part;

wherein the speaker judging part determines that the input voice is the voice of the registered person specified by the identity claim, in the case where the verification distance calculated in the speaker distance calculating part is included in a region defined by the input false acceptance error rate in the probability distribution of the interspeaker distances.

2. (CURRENTLY AMENDED) The speaker verification apparatus according to claim 1, wherein:

~~wherein~~ it is assumed that the probability distribution of the speaker distances is a normal distribution function; and

the speaker judging part determines that the input voice is the voice of the registered person specified by the identity claim, in the case where the verification distance calculated in the speaker distance calculating part is included in a region defined by the input false acceptance error rate in the probability distribution of the speaker distances obtained from the normal distribution function.

3. (CURRENTLY AMENDED) The speaker verification apparatus according to claim 1, wherein:

~~wherein~~ the probability distribution of the speaker distances is obtained for each gender.

4. (CURRENTLY AMENDED) The speaker verification apparatus according to claim 1, wherein:

~~wherein~~ the probability distribution of the speaker distances is obtained as a weighting addition of a plurality of normal distributions.

5. (CURRENTLY AMENDED) A method for verifying a speaker, comprising:

inputting an identity claim;

selecting voice information of a registered speaker corresponding to the input identity claim;

inputting a voice of the speaker;

analyzing the input voice;

calculating a verification distance between a feature parameter of the input voice and that of the voice of the registered speaker and the speaker distances between a feature parameter of the input voice and those of voices of speakers other than the registered speaker, based on the analysis results and the voice; and

determining whether or not the input voice matches the registered speaker corresponding to the input identity claim;¹

~~the method further comprising:~~

inputting a false acceptance error rate as a threshold, the false acceptance error being predetermined by a system manager or a user or adjustable depending on performance; and

obtaining a probability distribution of the interspeaker distances based on the calculated speaker distances;

wherein it is determined that the input voice is the voice of the registered person specified by the identity claim, in the case where the calculated verification distance is included in a region defined by the input false acceptance error rate in the probability distribution of the interspeaker distances.

6. (CURRENTLY AMENDED) A computer-readable recording medium storing a program to be executed by a computer, the program comprising:

inputting an identity claim;

selecting voice information of a registered speaker corresponding to the input identity claim;

inputting a voice of the speaker;

analyzing the input voice;

calculating a verification distance between a feature parameter of the input voice and that of the voice of the registered speaker and the speaker distances between a feature parameter of the input voice and those of voices of speakers other than the registered speaker, based on the analysis results and the voice; and

determining whether or not the input voice matches the registered speaker corresponding to the input identity claim;¹

~~the program further comprising:~~

inputting a false acceptance error rate as a threshold, the false acceptance error rate being predetermined by a system manager or a user or adjustable depending on performance; and

obtaining a probability distribution of the interspeaker distances based on the calculated speaker distances;

wherein it is determined that the input voice is the voice of the registered person specified by the identity claim, in the case where the calculated verification distance is included in a region defined by the input false acceptance error rate in the probability distribution of the interspeaker distances.

7. (NEW) The speaker verification apparatus according to claim 1, further comprising:

a voice database in which voices of other registered speakers are previously registered;

a background noise input part for inputting a background noise of an input voice;

a noise addition part for adjusting an input environment by adding the background noise input via the background noise input part to the voices of the other registered speakers stored in the voice database; and

a registration voice analyzing part for converting the voices of the other registered speakers with the background noise added thereto and the input voice respectively into feature parameters, and storing the feature parameters in the speaker storing part.

8. (NEW) The speaker verification apparatus according to claim 1, further comprising:

a voice database in which voices of other registered speakers are previously stored;

a background noise input part for inputting a background noise of an input voice;

a registration voice analyzing part for converting the voices of the other registered speakers and the input voice respectively into feature parameters, and storing the converted feature parameters in the speaker storing part; and

a noise addition part for adjusting an input environment based on the background noise input via the background noise input part, with respect to the feature parameters obtained by the conversion from the voice of the other registered speakers.

9. (NEW) The speaker verification method according to claim 5, wherein:

in the determining, it is assumed that the probability distribution of the speaker distances is a normal distribution function; and

the input voice is determined to be the voice of the registered person, in the case where the verification distance is included in a region defined by the false acceptance error rate in the probability distribution of the speaker distances obtained from the normal distribution function.

10. (NEW) The speaker verification method according to claim 5, wherein:

the probability distribution of the speaker distances is obtained for each gender.

11. (NEW) The speaker verification method according to claim 5, wherein:

the probability distribution of the speaker distances is obtained as a weighting addition of a plurality of normal distributions.

12. (NEW) The speaker verification method according to claim 5, further comprising:

inputting a background noise of an input voice;

adjusting an input environment by adding the background noise to the voices of the other registered speakers previously stored in a voice database; and

converting the voices of the other registered speakers with the background noise added thereto and the input voice respectively into feature parameters, and storing the feature parameters as voices of registered speakers.

13. (NEW) The speaker verification method according to claim 5, further comprising:

inputting a background noise of an input voice;

converting the voices of the other registered speakers previously stored in a voice database and the input voice respectively into feature parameters; and

adjusting an input environment based on the background noise with respect to the feature parameters obtained by the conversion from the voices of the other registered speakers.

14. (NEW) The recording medium according to claim 6, wherein:

in the determining, the program assumes that the probability distribution of the speaker distances is a normal distribution function, and determines that the input voice is the voice of the registered person, in the case where the verification distance is included in a region defined by the false acceptance error rate in the probability distribution of the speaker distances obtained from the normal distribution function.

15. (NEW) The recording medium according to claim 6, wherein:

the probability distribution of the speaker distances is obtained for each gender.

16. (NEW) The recording medium according to claim 6, wherein:

the probability distribution of the speaker distances is obtained as a weighting addition of a plurality of normal distributions.

17. (NEW) The recording medium according to claim 6, wherein:

the program further comprises:

inputting a background noise of an input voice;

adjusting an input environment by adding the background noise to the voices of the other registered speakers previously stored in a voice database; and

converting the voices of the other registered speakers with the background noise added thereto and the input voice respectively into feature parameters, and storing the feature parameters as voices of registered speakers.

18. (NEW) The recording medium according to claim 6, wherein the program further comprises:

inputting a background noise of an input voice;
converting the voices of the other registered speakers previously stored in a voice database and the input voice respectively into feature parameters; and
adjusting an input environment based on the background noise with respect to the feature parameters obtained by the conversion from the voice of the other registered speakers.